REMARKS

By this amendment, the specification has been editorially amended, claim 1 has been canceled and claims 2-7 have been amended. Currently, claims 2-7 are pending in the application.

The indication that claims 2 and 3 contain allowable subject matter is noted with appreciation.

The Examiner stated that claim 1 was rejected under 35 USC 102(b) as being anticipated by Guzik et al. (U.S. Patent No. 6,242,910). This rejection is now moot in view of the amendments to the claims and the remarks below.

By this amendment, claim 1 has been canceled and claims 2 and 3 which were indicated to contain allowable subject matter have been rewritten into independent form including the limitations of canceled independent claim 1. It is therefore respectfully submitted that amended claims 2 and 3 are allowable.

Claims 4, 6 and 7 were rejected under 35 USC 103(a) as being obvious over Guzik et al. in view of Albrecht et al. (U.S. Patent No. 6,229,664). The Examiner admitted that Guzik et al. did not disclose a reflective scale for detecting the position of the head. The Examiner relied on Albrecht et al. for the teachings of using

the reflective scale for detecting the position of the head. The Examiner also believed that it would have been obvious to modify the position detection of Guzik et al. with the reflective scale position detection as taught by Albrecht et al.

This rejection is respectfully traversed in view of the following remarks.

The present invention relates to a head clamping apparatus for a magnetic disk tester that tests the electromagnetic transducing characteristics of a magnetic disk and magnetic head that are essential parts of a hard disk drive. In particular, the present invention relates to a head clamping apparatus for positioning a magnetic head onto a target track on a magnetic disk and measuring the write/read characteristics of the magnetic head, and to a magnetic disk tester provided with a head clamping function.

In one embodiment of the present invention, Fig. 12 shows that the tester 210 has a two-dimensional coarse stage 214 consisting of an X-axis stage 214a that is movable along a X-axis and a Y-axis stage 214b that is movable along a Y-axis. Two coarse stages 214 are symmetrically arranged about a magnetic disk 212 that is driven by a spindle 209.

On the coarse stage 214, a head mechanism 215 is connected. The head mechanism 215 has a laser head 217 and a head clamp 218.

The head clamp 218 supports a magnetic head assembly 201 to write and read information to and from the magnetic disk 212.

In Fig. 14A, the microactuator 205 has the piezo-element 271 and the piezo-stage 273 that holds the piezo-element 271. The piezo-stage 273 has a parallel plate spring structure to enlarge a displacement of the piezo-element.

Fig. 14B and 14C show an example of a head clamping mechanism to attach the magnetic head assembly 201 to the head load mechanism. In Fig. 14B, a base 279 of the piezo-stage 273 is attached to a front end of the head clamp 218 with bolts 281. A front end of the piezo-stage 273 holds the head attachment 220.

To the head attachment 220, the magnetic head assembly 201 is removably attached. The magnetic head assembly 201 includes a suspension 285 and a magnetic head core 289 attached to a front end of the suspension 285. In Fig. 14B, the suspension 285 is attached to the head attachment 220 with a screw 287 through a plate spring. If the data write/read performance of the magntic head assembly 201 deteriorates, the magnetic head assembly 201 may be replaced with a new one at low cost without replacing the microactuator 205 on which the reflective scale 222 is formed. Fig. 14C is an inverted view of Fig. 14B. The reflective scale 222 is formed on the piezo-

stage 273 opposite to the magnetic head assembly 201. Fig. 11 also shows the reflective scale 222.

The magnetic head assembly 201 is moved in parallel with the magnetic disk 212, and the laser head 217 fixed to the coarse stage 214 emits a laser beam toward the reflective scale 222. A reflected beam from the reflective scale 222 is received by the laser head 217. The reflective scale 222 is made of a polycarbonate substrate on which metal thin film stripes are formed at the intervals of about 1μm.

In Fig. 15, the laser head 217 emits a laser beam which is reflected by the reflective scale 222 and the reflected beam is received by the laser head 217. A signal corresponding to the received reflected beam is detected by the detector 227 which provides a high-resolution signal indicating the position of the head attachment 220 relative to the magnetic disk 212.

Claim 4 recites "a reflective scale made of a film being disposed on a back face of the piezo-stage, and light-shield stripes being deposited on the film at regular intervals". Claim 4 also recites "a laser head attached to the coarse stage having a light emission/reception part facing the light-shield stripes of the reflective scale".

Similarly, claim 7 recites "a reflective scale attached to a back face of the linear micromotion stage, having light-shield stripes formed at regular intervals". Claim 7 also recites "a laser head attached to the linear coarse stage and having a light emission/reception part facing the light-shield stripes of the reflective scale". These features are not shown or suggested by the prior art of record.

Guzik et al. relate to magnetic head and disk testers, and more particularly to testers with improved accuracy in positioning a magnetic head with respect to a disk.

Guzik et al. disclose that in Fig. 3A, linear movements of deformable body 16 along the X-axis are measured by two optical linear encoders 68a, 68b, 70a and 70b in column 5, lines 58-60.

Guzik et al. also disclose in column 6, lines 35-40, that part A of the closed-loop control system 80 receives a signal representative of the linear displacement or position of the left side of top element 16a from the left optical linear encoder 68a, 68b. The position of the left optical detector 68b with respect to left glass scale 68a is compared with the command position X_0 in adder 82a.

Guzik et al. also disclose that part B of the closed-loop control system 80 gets positioning information from the right

optical linear encoder 70a, 70b in column 6, lines 53-55. In a manner similar to that described with respect to part A, part B generates a control signal for the right piezo actuator 56b using two adders 82b and 88b, an integrator 84b, a differentiator 86b, a filter 90b, and an amplifier 91a. Accordingly, a right positioning error P_R, integral I_R and derivative D_R are determined to produce the control signal. This control signal is a function of the difference between command position X_0 and detected position of the right optical detector 70b with respect to right glass scale 70a. As a result, piezo actuator 58a moves the right side 74 of the top link 16a of deformable body 16 in the direction opposite to the positioning error P_R (for right side 74), i.e., to the command position X_0 (see column 6, lines 55-67).

The Examiner stated that Guzik et al. disclose a scale (column 5, lines 66-66) made of a film being disposed on a back face of the piezo-stage, and light-shield stripes being disposed on the film at regular intervals. However, applicants respectfully submit that Guzik et al. do not disclose a reflective scale, a film or that the film has light-shield stripes. Further, Guzik et al. do not disclose a reflective scale made of a film being disposed on a back face of the piezo-stage, and light-shield

stripes being deposited on the film at regular intervals as recited in claim 4.

Guzik et al. also do not disclose a laser head attached to the coarse stage having a light emission/reception part facing the light-shield stripes of the reflective scale as recited in claim 4.

Guzik et al. also do not disclose a reflective scale attached to a back face of the linear micromotion stage, having light-shield stripes formed at regular intervals as recited in claim 7.

Guzik et al. also do not disclose a laser head attached to the linear coarse stage and having a light emission/reception part facing the light-shield stripes of the reflective scale as recited in claim 7.

Albrecht et al. do not make up for the deficiencies in Guzik et al.

Albrecht et al. relate to head-disk interface testers, also called "spin stands" for testing the head-disk interfaces of magnetic recording disk drives.

Albrecht et al. disclose that Fig. 3 show three angular positions of the actuator arm and illustrates that for all angular positions of the actuator arm 42, the laser beam intersects the actuator pivot axis 43 before it strikes the sensor 38. In an

alternative embodiment of the laser and sensor, the laser can be fixed and a planar mirror located on the rotatable portion of the actuator.

Albrecht et al. also disclose that a planar mirror can be attached to the platform 26 so that the actuator pivot axis intersects the mirror's reflective surface. The diode laser 36 can then be located on the fixed plate 25 with its laser beam directed at the pivot axis. In this embodiment, the laser beam would intersect the pivot axis and then be reflected off the planar mirror back to the sensor 38.

The position detecting means of Albrecht et al. is not for detecting a coarse position of a coarse stage as a previous step for precise positioning of a magnetic head 35 (relatively fixed to a platform 26) but for directly detecting a rotational angle of the actuator arm 42.

Albrecht et al. do not disclose a reflective scale made of a film being disposed on a back face of the piezo-stage, and light-shield stripes being deposited on the film at regular intervals as recited in claim 4.

Albrecht et al. also do not disclose a laser head attached to the coarse stage having a light emission/reception part facing the

light-shield stripes of the reflective scale as recited in claim 4.

Albrecht et al. also do not disclose a reflective scale attached to a back face of the linear micromotion stage, having light-shield stripes formed at regular intervals as recited in claim 7.

Albrecht et al. also do not disclose that a laser head attached to the linear coarse stage and having a light emission/reception part facing the light-shield stripes of the reflective scale as recited in claim 7.

Applicants respectfully submit that Guzik et al. and Albrecht et al. do not disclose the reflective scale made of the film as claimed in the present invention and also do not disclose light-shield stripes which are disposed on the reflective scale. Albrecht et al. disclose the planar mirror as discussed above. However, applicants also respectfully submit that the planar mirror is not the reflective scale as claimed in the present invention. The planar mirror is just a mirror attached on the platform so that the diode laser can be located on the fixed plate with its laser beam directed at the pivot axis and the laser beam is reflected off the planar mirror back to the sensor. Also, the laser head of the present invention has both features such as emitting and receiving

the laser beam. Therefore, applicants respectfully submit that Albrecht et al. do not teach or suggest the reflective scale as claimed in the present invention. Thus a person skilled in the art would not have made the claimed invention by modifying Guzik et al. in view of Albrecht et al.

Claims 5 and 6 were rejected under 35 USC 103(a) as being obvious over Guzik et al. and Albrecht et al. and further in view of Karaaslan et al. (U.S. Patent No. 6,023,145). The Examiner admitted that Guzik et al. and Albrecht et al. did not disclose a servo position signal (bursts) for testing the head/disk assembly. The Examiner believed that Karaaslan et al. were relied on the servo position signal for testing the head/disk assembly. The Examiner also believed that it would have been obvious to modify the testing apparatus of Guzik et al. and Albrecht et al. with the servo position signal as taught by Karaaslan et al.

This rejection is respectfully traversed in view of the following remarks. Karaaslan et al. do not make up for the deficiencies in Guzik et al. and Albrecht et al.

Karaaslan et al. relate to magnetic head/disk testers, in particular, to testers of the aforementioned type with a closed-loop positioning system and to a method for eliminating thermal drift of magnetic head position in such testers.

Karaaslan et al. disclose that a carriage 30 supports an outer ring 35 that in turn supports an inner ring 33, centered about the intersection of the X and Y axes of a horizontal coordinate system on carriage 30. The inner ring 33 carries a magnetic head support 32 with a magnetic head 34 to be tested.

Karaaslan et al. also disclose that two inputs of the position controller 49 are connected to the outputs of the linear encoders 40 and 42; two other inputs of the position controller 49 are connected to the servo burst amplitude outputs of the servo analyzer 45. The sequence of sector pulses is applied to another input of the position controller 49. The output of the position controller 49 is electrically connected to the piezo actuator 37.

Karaaslan et al. do not disclose a reflective scale made of a film being disposed on a back face of the piezo-stage, and light-shield stripes being deposited on the film at regular intervals as recited in claim 4.

Karaaslan et al. also do not disclose a laser head attached to the coarse stage having a light emission/reception part facing the light-shield stripes of the reflective scale as recited in claim 4.

Karaaslan et al. also do not disclose a reflective scale attached to a back face of the linear micromotion stage, having light-shield stripes formed at regular intervals as recited in claim 7.

Karaaslan et al. also do not disclose a laser head attached to the linear coarse stage and having a light emission/reception part facing the light-shield stripes of the reflective scale as recited in claim 7.

It is therefore submitted that one of ordinary skill in the art would not have combined Guzik et al., Albrecht et al. and Karaaslan et al. to render the claimed invention obvious. Specifically, there is no teaching in any one of the patents disclosing that a reflective scale made of a film being disposed on a back face of the piezo-stage, and light-shield stripes being disposed on the film at regular intervals. In addition, there is no teaching in any one of the patents disclosing a laser head attached to the coarse stage having a light emission/reception part facing the light-shield stripes of the reflective scale. Further, there is no suggestion in Guzik et al., Albrecht et al. and Karaaslan et al. for combining such a feature to render the claimed invention obvious.

For these reasons, it is believed that Guzik et al., Albrecht et al. and Karaaslan et al. do not show or suggest the claimed features of the present invention.

In view of foregoing claim amendments and remarks, it is respectfully submitted that the application is now in condition for allowance and an action to this effect is respectfully requested.

Applicants also respectfully submit that the amendments to claims 4-7 were to clarify the claim language and were not done for reasons related to patentablitiy.

If there are any questions or concerns regarding the amendments or these remarks, the Examiner is requested to telephone the undersigned at the telephone number listed below.

Respectfully submitted,

Date: August 17, 2004

Randolph A. Smith
Reg. No. 32,548

SMITH PATENT OFFICE
1901 Pennsylvania Ave., N.W.,
Suite 200
Washington, DC 20006-3433
Telephone: 202/530-5900
Facsimile: 202/530-5902
Takagi081704